Hydrologic Redistribution and Rhizosphere Microbiology of Shrubs as Resource Islands in Degraded Agro-ecosystems of the Sahel

Purpose

The project is investigating the microbiology and hydrology of shrub-crop rhizospheres to develop sustainable agricultural systems for the ecologically fragile African Sahel.

Impact

This is an extraordinary, cross-cultural collaboration of African and U.S. scientists conducting state-of-the-art research. This team discovered 2 local shrubs that perform rhizosphere hydrologic lift (HL) of water and significantly increase crop production in the Sahel. They are investigating beneficial microorganisms, water stress reduction, and nutrient dynamics.

Their work has shown that HL enables rhizosphere microbial communities to function and drive biogeochemical processes over the extended Sahelian dry season, changing the paradigm of how arid ecosystems function. An Advanced Training in Tropical Microbial Ecology for 40 U.S./African early-career scientists is being conducted. Three post-docs, 4 past and 4 current PhDs, and undergraduates have/are conducting research in Senegal.

Ohio State Colleges/Units Involved

School of Environment and Natural Resources
Department of Plant Pathology
Department of Microbiology
College of Food, Agricultural and Environmental Sciences

Community Partners Involved

University of California, Merced
Central State University
USDA-ARS, Oregon
University of Thies
Institut Senegalais de Recherches Agricoles
French Insitut de Recherche pour le Development

Funding

U.S. National Science Foundation, $3.9 million

Project outcomes are providing a foundation for developing biologically based agricultural systems with inter-cropped shrubs as nutrient/water reservoirs. These systems capitalize on local resources to increase food security and remediate degraded land which threatens over 37 million Sahelian acres.

Contact

Director: Richard Dick
School of Environment and Natural Resources
dick.78@osu.edu

Co-PI: Brian McSpadden Gardner
Department of Plant Pathology

Co-PI: John Reeve
Department of Microbiology

Co-PI: Teamrat Ghezzehei
School of Natural Sciences
University of California, Merced

Co-PI: Cadance Lowell
Department of Biology
Central State University

Project Coordinator: Amanda Davey
School of Environment and Natural Resources
davey.22@osu.edu
www.oardc.ohio-state.edu/senegal-pire

THE OHIO STATE UNIVERSITY